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REPORT
CD NO.

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COUNTRY USSR
SUBJECT Scientific - Electronics, television, medical electronics
HOW PUBLISHED Bimonthly periodical
WHERE PUBLISHED Moscow
DATE PUBLISHED Mar - Apr 1953
LANGUAGE Russian

DATE OF INFORMATION 1953
DATE DIST. 23 Sep 1953
NO. OF PAGES 2
SUPPLEMENT TO REPORT NO.

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SOURCE Rentgenologii i Radiologii, No 2, pp 54-57.

USE OF TELEVISION IN ROENTGENOLOGY

[The following is a summary of a paper co-authored by Engineer V. S. Mokolov, chief of the Central Test Station for Metals, Ministry of Electric Power Stations, and K. P. Molokanov, Doctor of Medical Sciences. The latter is a member of the Institute of Labor Hygiene and Occupational Diseases, Academy of Sciences USSR, whose director is Professor A. A. Letavet, Active Member of the Academy of Medical Sciences USSR. The paper describes the use of television equipment to obtain better shadow pictures in roentgenoscopy.]

In the existing method of roentgenoscopy, the picture must be observed in darkness or after proper eye adaptation because of insufficient brightness of the fluorescent screen. In addition, the roentgenologist is continuously in the path of X-rays during the entire exposure.

A sharper, brighter picture cannot be obtained by using thin films (0.3-0.5 mm) of fluorescent material because of the high penetrating power of X-radiation. The use of certain crystals, notably anthracene, as screen material has produced a brighter picture but the operator is still continuously exposed. The technical difficulties in developing a scanning X-ray tube have been too great to overcome.

Television can be used to overcome the difficulties mentioned above. A regular series-produced superorthicon transmitting tube was used in these experiments to intensify the brightness of the X-ray picture on a fluorescent screen. The installation used for this purpose is shown in the appended figure.

The X-ray tube in the diagram is the usual diagnostic type. The object of the exposure is set between the tube and the screen, on which an X-ray picture easily visible in the dark is obtained. From the screen, the image is transferred by means of an optical system to the photocathode of a superorthicon. Further operation of the circuit is the same as that of a mobile transmitting-receiver television installation with wire communications. The mobile installation of the Moscow Television Center was used in these experiments, as the special unit being built for this purpose was still being assembled.

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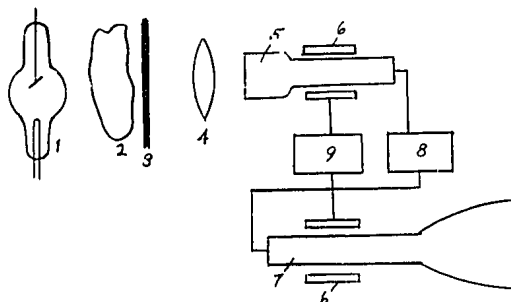
As seen in the appended figure, the scanning of the superorthicon operates synchronously with the scanning of the kinescope (7), the common scanning unit (9), and the individual deflecting coils (6). The light signals from the fluorescent screen, transformed in the superorthicon into electrical pulses, are fed to the amplifier (8). The amplified signals are applied to the kinescope and an image of the exposed object, visible in ordinary light, appears.

With wire communications, the receiving kinescope can be placed a considerable distance from the X-ray equipment and from the superorthicon; it can even be put in another room. In the experiments, this distance was as large as 30 meters. Telephone communications, with a loudspeaker as a receiver, were used between the place where the kinescope was located and the room containing the X-ray equipment and superorthicon. Instructions to move the patient into the necessary positions for exposure were transmitted over this line.

The intensity of the electrical signals obtained from the superorthicon is sufficient to permit the unit to be connected to a television station so that the picture could be transmitted over the entire area covered by the television center.

The X-ray television installation was used to obtain sharper pictures of the chest and of the bones and tissues of the extremities.

The experiments also revealed some defects in the installation, e. g., the picture definition of the chest and extremities could have been better. From the experiments, technical methods were found for eliminating these defects through the use of a special attachment to the superorthicon. Even in its present form, however, the installation can be used in some cases of X-ray diagnosis.



Television Equipment for Making X-Ray Pictures Visible in Ordinary Light

1- X-ray tube; 2- object exposed; 3- fluorescent screen;
4- lens; 5- superorthicon; 6- focusing and deflecting
coils; 7- television kinescope; 8- amplifier; 9- scanning
unit

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